

CDEFFS

ANSI/NIST
Committee to Define an
Extended Fingerprint Feature Set

Workshop

April 2006

Extended Features Under Consideration

Level 1 Features

- a. Ridge flow
- b. Cores and deltas
- c. Finer level of classification

Level 2 Features

- a. Ridge path elements
- b. Open field of ridges
- c. Greater definition of minutiae
- d. Scars
- e. Creases
- f. Incipient ridges
- g. Dots

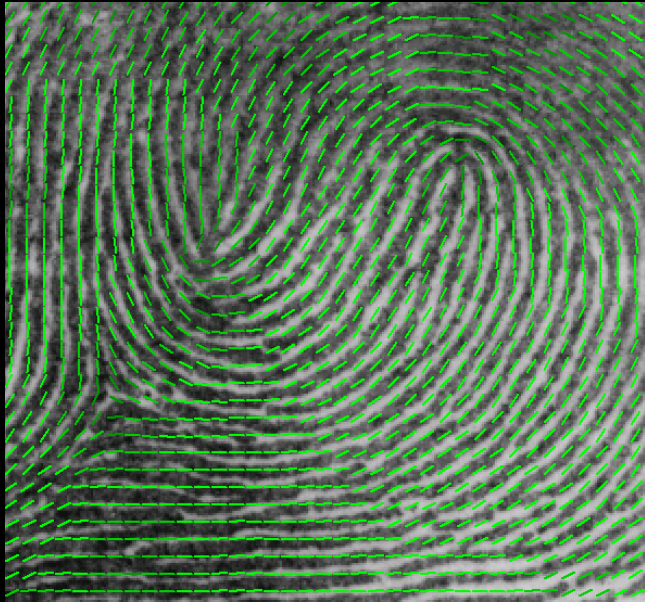
Level 3 Features

- a. Pores
- b. Ridge edge shapes/width

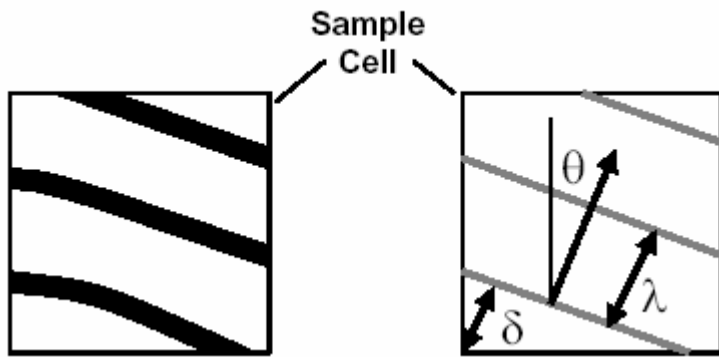
3d Features

- a. Ridge height / valley depth

1a: Ridge flow



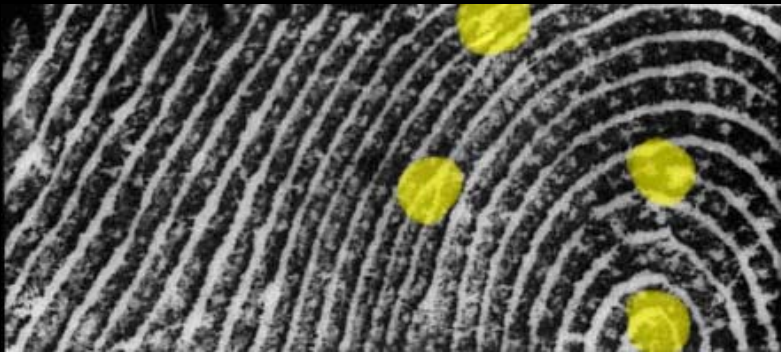
- Define the direction of ridge flow for every $N \times N$ pixel block in the image (or every pixel), if it can be determined.
- Issues:
 - How big is $N \times N$? ($0.016'' = 8/500$) Is it configurable or fixed?
 - How big is the window? ($0.048'' = 24/500$)
 - How do we quantize angles? (degrees, $1/32$ circle ...)
 - Are angles along ridgeflow (traditional) or perpendicular to ridgeflow (ANSI-INCITS-377)
 - Note this is tied to local ridge flow quality (next)
- Elaborations (re [ANSI-INCITS-377])
 - ridge spacing (distance between ridges)
 - phase offset (position that the ridges enter the block)



1a: Ridge flow direction

- Definition example (16-direction, in hex):
 - x.yyy:
 - 8888888899999aaaabbbbbbaaaa998888888888<rs>
 - 8899999999aaabbbbbbbccbbbaaa99999888888<rs>
 - 999999999aaaabbbbccccccbbbbbbaa9999999999<rs>
 - 9999999aaaabbbbcccddddccbbbbbbaa9999999

2b: Open Field of Ridges Local Ridge Flow Quality



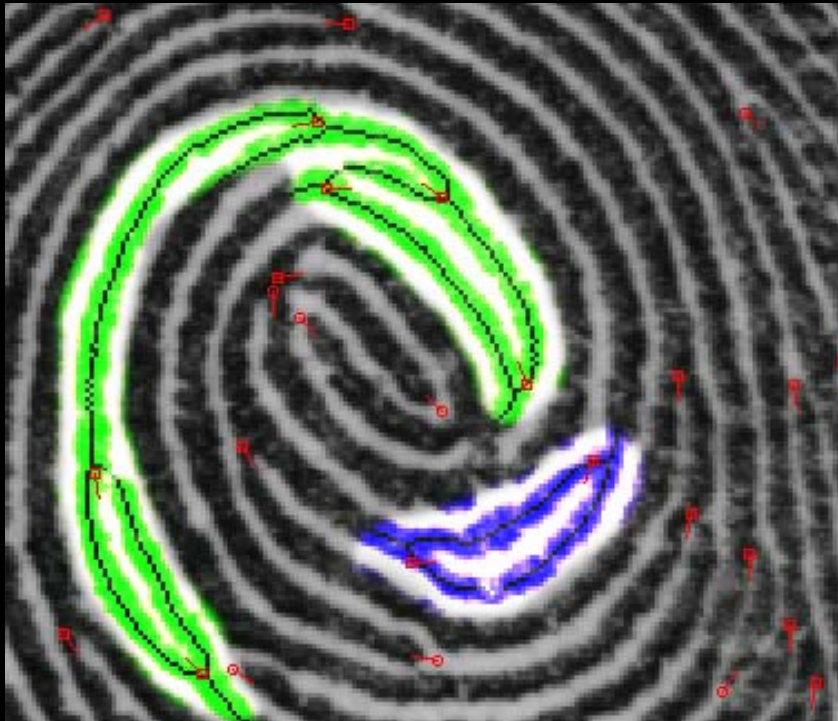
- Logically related to ridge flow
- Boolean (good | bad)
- Tristate:
 - Good | Marginal | Unusable
- Multi-level:
 - 0: No ridge information
 - 1: Level 1/direction unclear
 - 2: Level 1 OK, level 2 unclear
 - 3: Level 2 OK, level 3 unclear
 - 4: All levels clear

2b: Local Ridge Flow Quality

■ Definition:

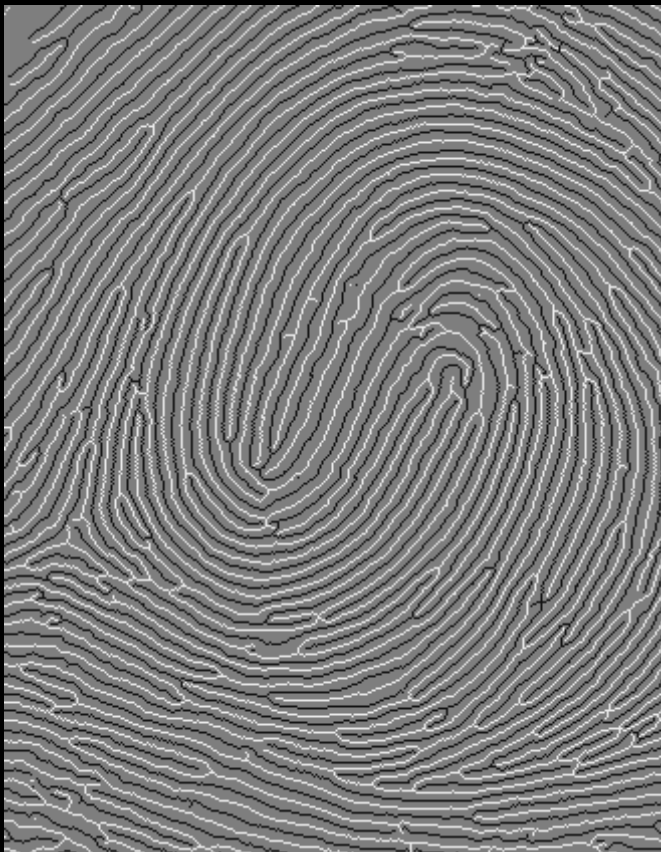
- [illegible]

2a: Ridge Path



- Option 1:
 - Index all ridge segments (ridge between two minutiae, end of image, or poor quality area). Each ridge ending is affiliated with one indexed ridge (3 for bifurcation).
 - Each ridge can be defined in a series of X, Y locations with fixed distance between OR by splines.
 - Level-3 details can reference back to the ridge segment number.

2a: Ridge Path



- Option 2:
 - Use the tracing as a representation

2g: Dots



- Are they treated as directionless minutiae? Are both ends defined as endings?
- How can (should) width be noted?

3c: Ridge/Valley width



- Major deviations
 - indentations
 - protrusions
 - discontinuities
- Measurements from
 - Edge-to-edge of a ridge
 - Edge-to-edge of a valley
 - Center-to-center of adjacent ridges